

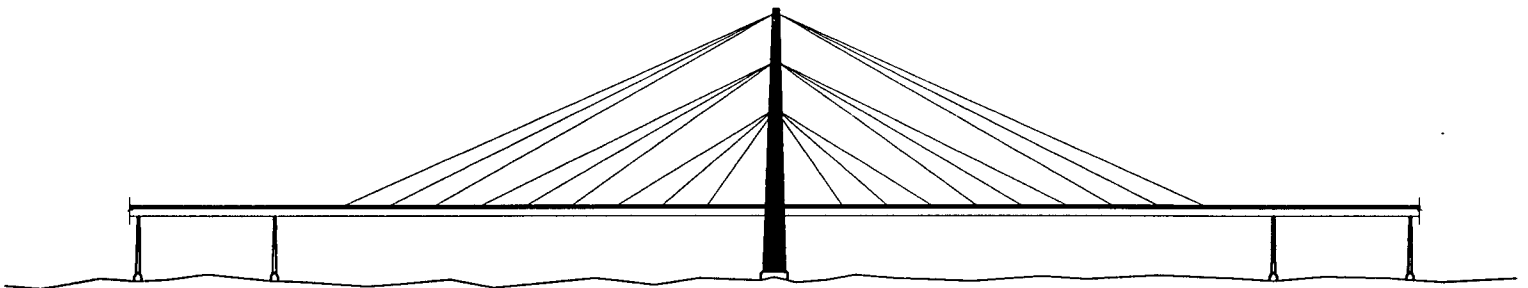
**BRIDGE PROPOSAL**

**for the**

**SAN FRANCISCO-OAKLAND BAY BRIDGE  
EAST BAY REPLACEMENT STRUCTURE**

**and**

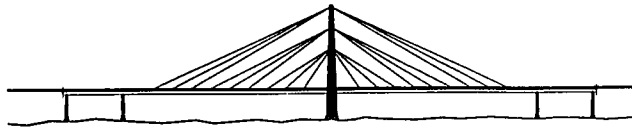
**RESPONSE TO THE CALTRANS ADVISORY PANEL REPORT (dated May 30,1997)**



**Submitted to the Engineering and Design Advisory Panel, EDAP  
of the Metropolitan Transportation Commission's Bay Bridge Design Task Force**

**by**

**R. GARY BLACK & DAVID GALBRAITH**



## **THE BLACK/GALBRAITH CURVED CABLE STAYED BRIDGE**

This proposal uses a single, two-legged tower to support a curved deck by means of cable stays connected from the tower to the center of the divided deck. The cables are aligned so that their force resultant under dead load produces only compressive stresses in the deck and only vertical forces in the tower. This is consistent with accepted engineering practice that seeks "balanced design" under dead load.

The proposal retains all of the advantages of the "inclined-tower, curved-deck" proposal. It has all of the advantages which are lacking in the "straight-deck" proposals now favored by the advisory panel. It also responds to all of the questions raised in the May 30, 1997 Report of the Caltrans Advisory Panel on Conceptual Design.

### **ALIGNMENT**

- \* The curved deck enables the use of the preferred geological alignment. This proposal places the main tower on bedrock on the tip of Yerba Buena Island and places the causeway piers on stiff bay mud uncontaminated by the old Temescal creek bed. The close-in Northern alignment also cuts the length of the bridge by 10% saving in construction costs as well as fuel costs over the lifetime of the bridge. Both the proposals favored by the Advisory Committee (the "suspension bridge with a single vertical tower and straight deck alignment" and the "cable stayed bridge with a single vertical tower and straight deck alignment") are flawed in that their straight-deck alignments result in longer bridges founded on poor soil base.

- \* This design meets the Caltrans minimum curvature requirements of 3000'.

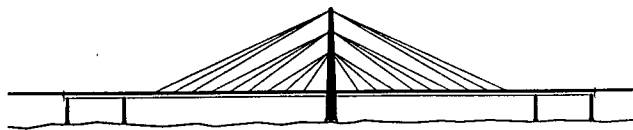
- \* The design is "scalable". It can be readily adapted for changes in (i) length of span, (ii) height of tower and (iii) radius of curvature.

### **STRUCTURE**

- \* The design is based on accepted engineering principles and experience; it requires no special engineering development or research.

- \* The tower is balanced under dead loads.

- \* The deck is independent of the tower, allowing seismic isolation between the tower and the deck. This answers the Panel's concern with that "inclined tower" proposal required a fixed translational connection between the tower and superstructure.



- \* The stresses in the deck are principally compressive.
- \* The design allows for a span of up to 1100'.
- \* The curved deck has better torsional performance than the straight deck proposals.

## **AESTHETICS**

- \* The MTC has sought a signature bridge for the citizens of the bay area. This means a bridge that is unique and uniquely fitted to the bay site. The proposals now favored by the panel do not have this signature quality. The curved deck and cable alignment we are proposing would make this bridge unlike any other, providing a unique entry to the East Bay.
- \* The bridge is visually transparent. The tower is a frame tower with relatively slender legs. The single line of cables, attached at three points on the tower, allow for maximum transparency and, when combined with the curved deck, provides an experience different from any straight-deck bridge.
- \* The decks are separated by 50', resulting in a lighter and more scenic bridge.
- \* The steel frame tower is consistent with the West Span of the Bay Bridge and with the Golden Gate Bridge.
- \* The tower and curved deck fit the topography.

## **MATERIAL**

- \* Steel tower; Concrete or steel deck.

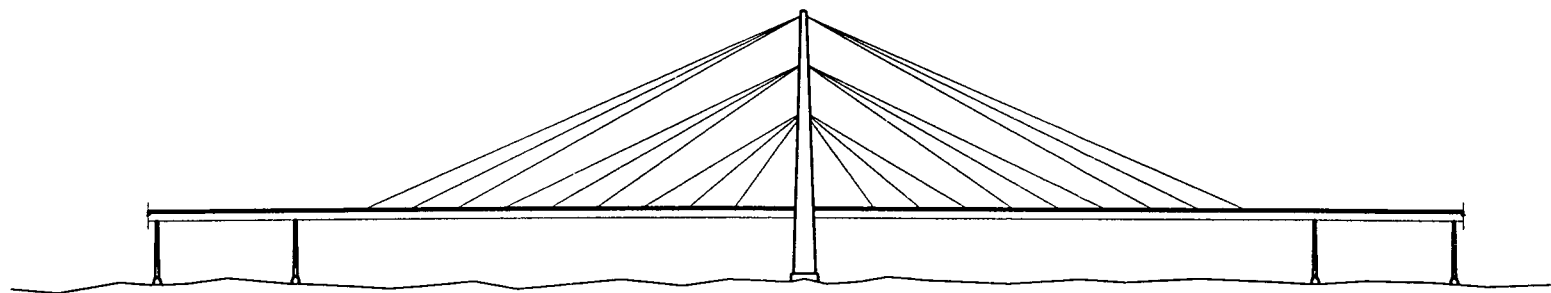
## **CONSTRUCTION**

- \* Construction takes advantage of standard construction technology for vertical towers. Construction can start at the towers and work outward in segments, unlike the suspension bridge proposal. The deck consists of equal curved segments.

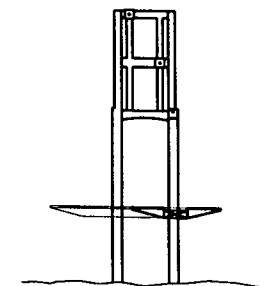
## **CONCLUSION**

The Black/Galbraith Proposal has all of the benefits of the two proposals now favored by the committee -- (i) it employs "a proven structural system with well established construction technology"; (ii) it decouples the tower-to-superstructure connection.

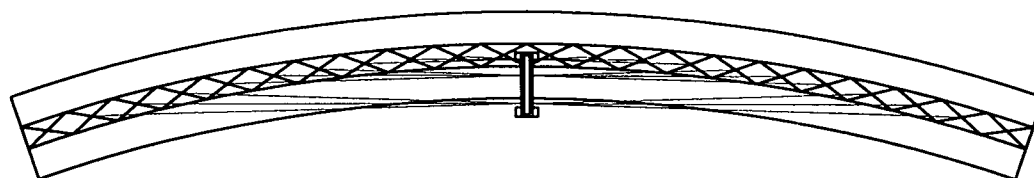
In addition, the Black/Galbraith proposal has the following benefits which the other proposals do not -- (i) it has aesthetic quality which forms a fitting entrance to the East Bay; and (ii) it has an alignment which saves in construction costs and fuel costs and which takes advantage of the only proper foundation base.



GENERAL ELEVATION



TOWER ELEVATION



PLAN

Box 7, Folder 8

**Item 4**

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